

WHAT IS CLAIMED IS:

1. A process for recovering a composition enriched in tetramantane components and other higher diamondoid components which process comprises:
 - a. selecting a feedstock comprising recoverable amounts of tetramantane components and other higher diamondoid components;
 - b. removing a sufficient amount of components from the feedstock having a boiling point less than the lowest boiling point tetramantane component under conditions wherein recoverable amounts of tetramantane components and other higher diamondoid components are retained in the treated feedstock; and
 - c. thermally treating the feedstock recovered in b) above to pyrolyze at least a sufficient amount of nondiamondoid components therefrom to permit recovery of tetramantane components and other higher diamondoid components from the pyrolytically treated feedstock wherein said pyrolysis is conducted under conditions to provide for a treated feedstock retaining recoverable amounts of tetramantane components and other higher diamondoid components.
2. A process of Claim 1 wherein the feedstock additionally comprises nondiamondoid components having a boiling point both below and above the lowest boiling point tetramantane component, and at least one lower diamondoid component.
3. A process for recovering a composition enriched in tetramantane components and other higher diamondoid components which process comprises:
 - a. selecting a feedstock comprising recoverable amounts of tetramantane components and other higher diamondoids components;

- b. thermally treating the feedstock to pyrolyze at least a sufficient amount of nondiamondoid components therefrom to permit recovery of tetramantane and other higher diamondoid components from the pyrolytically treated feedstock wherein said pyrolysis is conducted under conditions to provide for a treated feedstock retaining recoverable amounts of tetramantane components and other higher diamondoid components; and
 - c. removing a sufficient amount of those components from the feedstock surviving pyrolysis which components have a boiling point less than the lowest boiling point tetramantane component under conditions wherein recoverable amounts of tetramantane components and other higher diamondoid components are retained in the treated feedstock.
- 4. The process of Claim 2 wherein sufficient amounts of lower diamondoid components are removed from the feedstock to provide for a treated feedstock comprising a ratio of the amount of lower diamondoid components to higher diamondoid components of about 9:1 or less.
- 5. The process of Claim 4 wherein sufficient amounts of lower diamondoid components are removed from the feedstock to provide for a treated feedstock comprising a ratio of the amount of lower diamondoid components to the amount of higher diamondoid components of about 2:1 or less.
- 6. The process of Claim 5 wherein sufficient amounts of lower diamondoid components are removed from the feedstock to provide for a treated feedstock comprising a ratio of the amount of lower diamondoid components to the amount of higher diamondoid components of about 1:1 or less.

7. The process according to Claim 1 wherein at least about 10% of said tetramantane components and other higher diamondoid components are retained in the feedstock after procedure (b) as compared to that amount of such components present prior to said procedure.
8. The process according to Claim 7 wherein at least about 50% of said tetramantane components and other higher diamondoid components are retained in the feedstock after procedure (b) as compared to that amount of such components present prior to said procedure.
9. The process according to Claim 1 or 3 wherein at least about 10% of said tetramantane components and other higher diamondoid components are retained in the feedstock after pyrolysis as compared to that amount present prior to pyrolysis.
10. The process according to Claim 9 wherein at least about 50% of said tetramantane components and other higher diamondoid components are retained in the feedstock after pyrolysis as compared to that amount present prior to pyrolysis.
11. The process of Claim 1 or 3 wherein removal of nondiamondoid components and/or lower diamondoid components from the feedstock comprises distilling said feedstock.
12. The process of Claim 11 wherein at least about 50 weight percent of the lower diamondoid components, based on the total weight of lower diamondoid components present in the untreated feedstock, is removed.
13. The process of Claim 1 or 3 which further comprises recovering tetramantane and other higher diamondoid components from the product of step c) by use of one or more separation techniques selected from the group consisting of

chromatographic techniques, thermal diffusion techniques, crystallization, sublimation, and size separation techniques.

14. The process of Claim 13 wherein said separation technique is a chromatographic technique.
15. The process of Claim 14 wherein said chromatographic technique is selected from the group consisting of liquid chromatography, gas chromatography and high performance liquid chromatography.
16. The process of Claim 1 or 3 wherein the product of step c) comprises at least 10 weight percent of non-ionized tetramantane components and higher diamondoid components and at least 0.5 weight percent of non-ionized pentamantane components and higher diamondoid components based on the total weight of diamondoid components present.
17. The process of Claim 1 or 3 wherein the product of step c) comprises at least 10 weight percent of non-ionized tetramantane components and higher diamondoid components and at least 0.5 weight percent of non-ionized pentamantane components and higher diamondoid components based on the total weight of the recovered feedstock.
18. A process for recovering a composition enriched in tetramantane and pentamantane components which process comprises:
 - a. selecting a feedstock comprising recoverable amounts of tetramantane and pentamantane components;
 - b. removing a sufficient amount of components from the feedstock having a boiling point less than the lowest boiling tetramantane component under

conditions to provide a treated feedstock from which tetramantane and pentamantane components can be recovered; and

- c. recovering tetramantane and pentamantane components from said treated feedstock by separation techniques selected from the group consisting of chromatographic techniques, thermal diffusion techniques, zone refining, progressive recrystallization and size separation techniques.

- 19. A composition comprising at least tetramantane and pentamantane components wherein said composition comprises at least about 10 weight percent tetramantane components and at least 0.5 weight percent pentamantane components based on the total weight of diamondoid components present.
- 20. A composition of Claim 19 comprising at least about 25 weight percent tetramantane components and at least 0.5 weight percent pentamantane components based on the total weight of the composition.
- 21. A process which comprises:
 - a. selecting a feedstock comprising recoverable amounts of a higher diamondoid component or components selected for recovery, nondiamondoid components and diamondoid components having a boiling point less than the lowest boiling point higher diamondoid component selected for recovery;
 - b. removing from the feedstock a sufficient amount of components having a boiling point less than the lowest boiling point higher diamondoid component selected for recovery under conditions wherein recoverable amounts of the higher diamondoid component or components selected for recovery are retained in the treated feedstock; and
 - c. thermally treating the feedstock recovered in b) above to pyrolyze at least a sufficient amount of nondiamondoid components therefrom to permit

recovery of the selected higher diamondoid component or components from the thermally treated feedstock wherein the pyrolysis is conducted under conditions to provide a treated feedstock retaining recoverable amounts of the selected higher diamondoid component or components.

22. The process of Claim 21 wherein the feedstock additionally comprises nondiamondoid components having a boiling point both below and above the lowest boiling point selected higher diamondoid component, and at least one lower diamondoid component.
23. A process of Claim 21 additionally comprising the step d) recovering a composition enriched in one or more selected higher diamondoid components from said treated feedstock formed in b) above with one or more additional separation techniques selected from the group consisting of chromatographic techniques, thermal diffusion techniques, zone refining, progressive recrystallization and size separation techniques.
24. A process for recovering a composition enriched in one or more selected higher diamondoid components which process comprises:
 - a. selecting a feedstock comprising recoverable amounts of one or more selected higher diamondoid components and nonselected materials including nondiamondoid components;
 - b. fractionating the feedstock to form one or more cuts enriched in materials having boiling points in the range of from just below the boiling point of the lowest boiling selected higher diamondoid component to just above the boiling point of the highest boiling selected higher diamondoid component;
 - c. thermally degrading one or more cuts said to pyrolyze at least a sufficient amount of nondiamondoid components therefrom under conditions to

form one or more thermally treated cuts retaining recoverable amounts of selected higher diamondoid;

- d. recovering a composition comprising one or more selected higher diamondoid components from one or more said thermally treated cuts formed in c) above with one or more additional separation techniques selected from the group consisting of chromatographic techniques, thermal diffusion techniques, zone refining, progressive recrystallization and size separation techniques.

25. A process for recovering at least one selected higher diamondoid comprising selecting a feedstock containing a recoverable amount of the at least one selected higher diamondoid and recovering the at least one selected higher diamondoid from the feedstock by chromatography.
26. The process of Claim 25 wherein the chromatography is gas chromatography.
27. The process of Claim 25 wherein the chromatography is high pressure liquid chromatography.
28. The process of Claim 27 wherein the liquid chromatography comprises chromatography on two liquid chromatography columns in sequence with the two columns having differing selectivities.
29. The process of Claim 25 having an additional step and comprising selecting a feedstock containing a recoverable amount of the at least one selected higher diamondoid, treating the feedstock to produce a treated feedstock having an increased concentration of the at least one selected higher diamondoid, and recovering the at least one selected higher diamondoid from the treated feedstock by chromatography.

30. The process of Claim 29 wherein the treating comprises fractionating the feedstock and wherein the treated feedstock comprises a feedstock fraction.
31. The process of Claim 30 wherein the feedstock fraction is a distillation residue.
32. The process of Claim 30 wherein the feedstock fraction is an overhead fraction.
33. The process of Claim 29 wherein the treating comprises pyrolyzing and wherein the treated feedstock is a pyrolyzed feedstock.
34. The process of Claim 29 wherein the treating comprises fractionating the feedstock to yield a feedstock fraction containing the at least one selected higher diamondoid and pyrolyzing the feedstock fraction and wherein the treated feedstock is the pyrolyzed feedstock fraction.
35. The process of Claim 34 wherein the feedstock fraction is a distillation residue.
36. The process of Claim 34 wherein the feedstock fraction is an overhead fraction.
37. The process of Claim 29 wherein the treating comprises pyrolyzing the feedstock to yield a pyrolyzed feedstock and fractionating the pyrolyzed feedstock to yield a treated feedstock which is a pyrolyzed feedstock fraction containing the at least one selected higher diamondoid.
38. The process of Claim 29 wherein the treating comprises removing aromatic and polar components by low pressure liquid chromatography.
39. A process for recovering at least one selected higher diamondoid comprising selecting a feedstock containing a recoverable amount of the at least one selected higher diamondoid in admixture with nondiamondoid materials, aromatics and polar components, distilling the feedstock to yield an overhead and a bottoms, the

bottoms containing the at least one selected higher diamondoid, fractionating the bottoms to yield an overhead fraction containing the selected at least one higher diamondoid in admixture with nondiamondoid materials, aromatics and polar components, pyrolyzing the overhead fraction to reduce the concentration of nondiamondoid materials and to yield a pyrolyzed overhead fraction, treating the pyrolyzed overhead fraction by low pressure liquid chromatography to remove aromatics and polar components and yield a low pressure chromatographed pyrolyzed overhead fraction, and recovering the at least one selected higher diamondoid from the low pressure chromatographed pyrolyzed overhead fraction by final chromatography.

40. The process of Claim 39 wherein the final chromatography is gas chromatography.
41. The process of Claim 39 wherein the final chromatography is high pressure liquid chromatography.
42. The process of Claim 41 wherein the high pressure liquid chromatography comprises chromatography on two liquid chromatography columns in sequence with the two columns having differing selectivities.